UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,459	07/17/2003	Nobuo Suzuki	0649-0902P	9186

2292 7590 01/30/2008
BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER
YODER III, CHRISS S

ART UNIT	PAPER NUMBER
2622	

NOTIFICATION DATE	DELIVERY MODE
01/30/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/620,459	SUZUKI ET AL.	
	Examiner	Art Unit	
	Chriss S. Yoder, III	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-6* is/are rejected.

7)☒ Claim(s) *7 and 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn. A new Office action is provided below with respect to the amendment filed on May 16, 2007.

Drawings

The drawings received on September 30, 2003 were previously objected to for not specifying that Figure 3 is "Prior Art". Applicant argues, that although the features of Figure 3 are discussed in the Specification as being related art, the features are not considered by Applicants to qualify as "prior art", and therefore do not concede that the features of Figure 3 are statutory prior art and respectfully request that the objection to the Drawings be withdrawn.

However, the Examiner notes that the only description of Figure 3 is found in the section of the application titled *"Description of the related art",* and based on MPEP § 608.01(c), the *"Description of the related art"* includes "paragraph(s) describing to the extent practical the state of the prior art or other information disclosed known to the applicant, including references to specific prior art or other information where appropriate. Where applicable, the problems involved in the prior art or other information disclosed which are solved by the applicant's invention should be indicated."

The Examiner further notes, that the Specification discloses that "Fig. 3 is a view showing the schematic structure of a solid-state image pick-up device having a so-called honeycomb structure, that is, ***a conventional solid-state image pick-up device***

comprising a photoelectric converting device having a high sensitivity and a photoelectric converting device having a low sensitivity" on page 1, line 29 – page 2, line 2.

Therefore, Figure 3 is considered to be Prior Art by the Examiner, since it is disclosed as "a conventional solid-state image pick-up device" and that the only description is found in the *"Description of the related art".*

Thus, the objection of Figure 3 is maintained, and as such Figure 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Response to Arguments

Applicant's arguments with respect to claims 1, 3, and 4 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior art in view of Murakoshi (US Patent # 4,455,575) and further in view of Misawa (US Patent # 6,885,402).

2. In regard to **claim 1**, note Applicant discloses as admitted prior art (disclosure found in the specification of the present application), the use of a solid-state image pick-up device having a plurality of photoelectric converting devices arranged in a row direction and a column direction orthogonal thereto over a surface of a semiconductor substrate (figure 3: 10 and 20), comprising a vertical transfer section for transferring charges from the photoelectric converting devices in the column direction (figure 3: 30), a horizontal transfer section for transferring the charges from the vertical transfer section in the row direction (figure 3: 40), and an output section for outputting a signal corresponding to a charge transferred through the horizontal transfer section (figure 3: 50-51), wherein the photoelectric converting device includes a plurality of high-sensitivity photoelectric converting devices arranged like a tetragonal grid in the row direction and the column direction orthogonal thereto and serving to carry out a photoelectric conversion having a relatively high sensitivity, and a plurality of low-sensitivity photoelectric converting devices arranged like the tetragonal grid in the row

direction and the column direction orthogonal thereto and serving to carry out a photoelectric conversion having a relatively low sensitivity (page 1, line 24– page 2, line 23; and figure 3: pixels labeled 20 are considered the high-sensitivity pixels and pixels labeled 10 are considered the low-sensitivity pixels), the high-sensitivity photoelectric converting devices and the low-sensitivity photoelectric converting devices are arranged at an equal array pitch in positions shifted by 1/2 of the array pitch from each other in the row direction and the column direction (page 1, line 24– page 2, line 23; and figure 3: 10 and 20), the vertical transfer section includes a plurality of vertical transfer channels formed on the semiconductor substrate corresponding to the photoelectric converting devices provided in the column direction, a plurality of vertical transfer electrodes formed to cross each of the vertical transfer channels as seen on a plane (page 3, lines 7-27; and figure 3: 30 is considered to be the transfer channels and 101-104 are considered to be the transfer electrodes), and a charge reading regions for reading the charges of the photoelectric converting devices onto the vertical transfer channels (figure 3, the arrow extending from each pixel is considered the charge reading region), each of the vertical transfer channels takes a winding shape extended wholly in the column direction between the photoelectric converting devices (page 3, lines 7-27; and figure 3: 30), each of the vertical transfer electrodes takes a winding shape extended wholly in the row direction between the photoelectric converting devices (page 3, lines 7-27; and figure 3: 101-104) and the use of four vertical transfer electrodes provided corresponding to one of the photoelectric converting device adjacent to each other in the column direction and other four vertical transfer electrodes

are provided corresponding to the other of the photoelectric devices adjacent to each other in the column direction (figure 3: 101-104; in the column direction, each pixel is surrounded by four unique electrodes).

Therefore, the image pick-up device, as described by Applicant as prior art, lacks the charge reading regions of the photoelectric converting devices which are adjacent to each other in the column direction being formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each other, and that the vertical transfer electrodes are driven by vertical transfer pulses having eight phases.

Murakoshi discloses the use of charge reading regions of pixels which are adjacent to each other in the column direction which are formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each other (figure 3: 302 and 303). Murakoshi teaches that the use of charge reading regions of pixels which are adjacent to each other in the column direction which are formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each other is preferred in order to expose the sensor for both the odd an even fields simultaneously, while enabling each field to be output individually, so as to reduce the movement within the image caused by sequential exposures (column 1, line 45 – column 2, line 32). Therefore, it would have been obvious to one of ordinary skill in the art to modify the image sensor, as disclosed in Applicant's admitted prior art, to include the use of charge reading regions of pixels which are adjacent to each other in the column direction which are formed between the

adjacent photoelectric converting devices and the vertical transfer channels which are different from each other in order to expose the sensor for both the odd an even fields simultaneously, while enabling each field to be output individually, so as to reduce the movement within the image caused by sequential exposures, as suggested by Murakoshi.

Misawa discloses the use of an image pick-up device having four electrodes per pixel that uses vertical transfer pulses having eight phases to drive vertical transfer electrodes (column 6, lines 45-51 and column 10, lines 46-64). Misawa teaches that the use of vertical transfer pulses having eight phases to drive vertical transfer electrodes is preferred in order to provide a thinned image at high speed for photometry (column 10, lines 9-18 and column 12, lines 51-53). Therefore, it would have been obvious to one of ordinary skill in the art to modify the image sensor, as disclosed in Applicant's admitted prior art, to include the use of vertical transfer pulses having eight phases to drive vertical transfer electrodes in order to provide a high speed image to be used for photometry, as suggested by Misawa.

3. In regard to **claim 5**, note Misawa discloses the use of an image pick-up device that performs image thinning by selectively reading/outputting the rows of the image sensor (column 10, lines 9-18 and column 12, lines 46-57), and depending on the selected thinning rate, the charges of high-sensitivity photoelectric converting devices for two rows can be simultaneously transferred to the horizontal transfer section, or the charges of low-sensitivity photoelectric converting devices for two rows can be

simultaneously transferred to the horizontal transfer section (figures 10-14 and 18-21 are all examples of different image read out rates).

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior art in view of Murakoshi (US Patent # 4,455,575) and further in view of Yamada (US Patent # 4,810,901).

5. In regard to **claim 3**, note Applicant discloses as admitted prior art (disclosure found in the specification of the present application), the use of a solid-state image pick-up device having a plurality of photoelectric converting devices arranged in a row direction and a column direction orthogonal thereto over a surface of a semiconductor substrate (figure 3: 10 and 20), comprising a vertical transfer section for transferring charges from the photoelectric converting devices in the column direction (figure 3: 30), a horizontal transfer section for transferring the charges from the vertical transfer section in the row direction (figure 3: 40), and an output section for outputting a signal corresponding to a charge transferred through the horizontal transfer section (figure 3: 50-51), wherein the photoelectric converting device includes a plurality of high-sensitivity photoelectric converting devices arranged like a tetragonal grid in the row direction and the column direction orthogonal thereto and serving to carry out a photoelectric conversion having a relatively high sensitivity, and a plurality of low-sensitivity photoelectric converting devices arranged like the tetragonal grid in the row direction and the column direction orthogonal thereto and serving to carry out a photoelectric conversion having a relatively low sensitivity (page 1, line 24– page 2, line

23; and figure 3: pixels labeled 20 are considered the high-sensitivity pixels and pixels labeled 10 are considered the low-sensitivity pixels), the high-sensitivity photoelectric converting devices and the low-sensitivity photoelectric converting devices are arranged at an equal array pitch in positions shifted by 1/2 of the array pitch from each other in the row direction and the column direction (page 1, line 24– page 2, line 23; and figure 3: 10 and 20), the vertical transfer section includes a plurality of vertical transfer channels formed on the semiconductor substrate corresponding to the photoelectric converting devices provided in the column direction, a plurality of vertical transfer electrodes formed to cross each of the vertical transfer channels as seen on a plane (page 3, lines 7-27; and figure 3: 30 is considered to be the transfer channels and 101-104 are considered to be the transfer electrodes), and a charge reading regions for reading the charges of the photoelectric converting devices onto the vertical transfer channels (figure 3, the arrow extending from each pixel is considered the charge reading region), each of the vertical transfer channels takes a winding shape extended wholly in the column direction between the photoelectric converting devices (page 3, lines 7-27; and figure 3: 30), each of the vertical transfer electrodes takes a winding shape extended wholly in the row direction between the photoelectric converting devices (page 3, lines 7-27; and figure 3: 101-104).

Therefore, the image pick-up device, as described by Applicant as prior art, lacks the charge reading regions of the photoelectric converting devices which are adjacent to each other in the column direction being formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each

other, and that two vertical transfer electrodes are corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, other two vertical transfer electrodes are provided corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and the vertical transfer electrodes are driven by vertical transfer pulses having four phases.

Murakoshi discloses the use of charge reading regions of pixels which are adjacent to each other in the column direction which are formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each other (figure 3: 302 and 303). Murakoshi teaches that the use of charge reading regions of pixels which are adjacent to each other in the column direction which are formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each other is preferred in order to expose the sensor for both the odd an even fields simultaneously, while enabling each field to be output individually, so as to reduce the movement within the image caused by sequential exposures (column 1, line 45 – column 2, line 32). Therefore, it would have been obvious to one of ordinary skill in the art to modify the image sensor, as disclosed in Applicant's admitted prior art, to include the use of charge reading regions of pixels which are adjacent to each other in the column direction which are formed between the adjacent photoelectric converting devices and the vertical transfer channels which are different from each other in order to expose the sensor for both the odd an even fields simultaneously, while enabling each field to be output individually, so as to reduce the

movement within the image caused by sequential exposures, as suggested by Murakoshi.

Yamada discloses the use of an image pick-up device having that two vertical transfer electrodes are corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, other two vertical transfer electrodes are provided corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and the vertical transfer electrodes are driven by vertical transfer pulses having four phases (column 3, line 57 – column 4, line 42; and figure 4: electrodes 3). Yamada teaches that the use of two vertical transfer electrodes for each pixel in the column direction that are driven by vertical transfer pulses having four phases is preferred in order to increase transfer speed and decrease power consumption by reading out two groups of pixels at the same time (column 5, lines 40-50). Therefore, it would have been obvious to one of ordinary skill in the art to modify the image sensor, as disclosed in Applicant's admitted prior art, to include the use of two vertical transfer electrodes for each pixel in the column direction that are driven by vertical transfer pulses having four phases is preferred in order to increase transfer speed and decrease power consumption by reading out two groups of pixels at the same time, as suggested by Yamada.

6. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior art in view of Ochi et al. (US Patent # 4,012,587) and further in view of Yamada (US Patent # 4,810,901).

7. In regard to **claim 4**, note Applicant discloses as admitted prior art (disclosure found in the specification of the present application), the use of a solid-state image pick-up device having a plurality of photoelectric converting devices arranged in a row direction and a column direction orthogonal thereto over a surface of a semiconductor substrate (figure 3: 10 and 20), comprising a vertical transfer section for transferring charges from the photoelectric converting devices in the column direction (figure 3: 30), a horizontal transfer section for transferring the charges from the vertical transfer section in the row direction (figure 3: 40), and an output section for outputting a signal corresponding to a charge transferred through the horizontal transfer section (figure 3: 50-51), wherein the photoelectric converting device includes a plurality of high-sensitivity photoelectric converting devices arranged like a tetragonal grid in the row direction and the column direction orthogonal thereto and serving to carry out a photoelectric conversion having a relatively high sensitivity, and a plurality of low-sensitivity photoelectric converting devices arranged like the tetragonal grid in the row direction and the column direction orthogonal thereto and serving to carry out a photoelectric conversion having a relatively low sensitivity (page 1, line 24– page 2, line 23; and figure 3: pixels labeled 20 are considered the high-sensitivity pixels and pixels labeled 10 are considered the low-sensitivity pixels), the high-sensitivity photoelectric converting devices and the low-sensitivity photoelectric converting devices are arranged at an equal array pitch in positions shifted by 1/2 of the array pitch from each other in the row direction and the column direction (page 1, line 24– page 2, line 23; and figure 3: 10 and 20), the vertical transfer section includes a plurality of vertical transfer

channels formed on the semiconductor substrate corresponding to the photoelectric converting devices provided in the column direction, a plurality of vertical transfer electrodes formed to cross each of the vertical transfer channels as seen on a plane (page 3, lines 7-27; and figure 3: 30 is considered to be the transfer channels and 101-104 are considered to be the transfer electrodes), and charge reading regions for reading the charges of the photoelectric converting devices onto the vertical transfer channels (figure 3, the arrow extending from each pixel is considered the charge reading region), the vertical transfer channel takes a winding shape extended wholly in the column direction between the photoelectric converting devices (page 3, lines 7-27; and figure 3: 30), the vertical transfer electrode takes a winding shape extended wholly in the row direction between the photoelectric converting devices (page 3, lines 7-27; and figure 3: 101-104).

Therefore, the image pick-up device, as described by Applicant as prior art, lacks the use of a vertical transfer channel shaped as to connect two winding shapes that are shared for the transfer of the charges from the high-sensitivity photoelectric converting devices for one column and the transfer of the charges from the low-sensitivity photoelectric converting devices for another adjacent column, and that two vertical transfer electrodes are provided corresponding to the high-sensitivity photoelectric converting device for one column, other two vertical transfer electrodes are provided corresponding to the low-sensitivity photoelectric converting device for the other adjacent column, and the vertical transfer electrodes are driven by vertical transfer pulses having four phases

Ochi discloses the use of a vertical transfer channel shaped as to connect two winding shapes that are shared for the transfer of the charges from the pixels which are adjacent in both the row and column direction (i.e. adjacent in a tetragonal grid; figure 7: 3'). Ochi teaches that the use of a vertical channel shaped as to connect two winding shapes that are shared for the transfer of the charges from two columns is preferred in order to increase the area of the electrodes by reducing the number of shift registers to thereby enhance the transfer efficiency and decrease the noise (column 5, line 58 – column 6, line 27). Therefore, it would have been obvious to one of ordinary skill in the art to modify the image sensor, as disclosed in Applicant's admitted prior art, to include the use of a vertical channel shaped as to connect two winding shapes that are shared for the transfer of the charges from pixels which are adjacent in both the row and column direction (which based on the combination with Applicant's admitted prior art would include both a high-sensitivity and a low-sensitivity photoelectric converting devices) in order to increase the area of the electrodes by reducing the number of shift registers to thereby enhance the transfer efficiency and decrease the noise, as suggested by Ochi.

Yamada discloses the use of an image pick-up device having that two vertical transfer electrodes are corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, other two vertical transfer electrodes are provided corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and the vertical transfer electrodes are driven by vertical transfer pulses having four phases (column 3, line 57 – column 4, line 42; and

figure 4: electrodes 3). Yamada teaches that the use of two vertical transfer electrodes for each pixel in the column direction that are driven by vertical transfer pulses having four phases is preferred in order to increase transfer speed and decrease power consumption by reading out two groups of pixels at the same time (column 5, lines 40-50). Therefore, it would have been obvious to one of ordinary skill in the art to modify the image sensor, as disclosed in Applicant's admitted prior art, to include the use of two vertical transfer electrodes for each pixel in the column direction that are driven by vertical transfer pulses having four phases is preferred in order to increase transfer speed and decrease power consumption by reading out two groups of pixels at the same time, as suggested by Yamada.

8. In regard to **claim 6**, note Yamada discloses the charge reading regions of the photoelectric converting devices are formed such that the charges of high-sensitivity photoelectric converting devices for two rows can be simultaneously transferred to the horizontal transfer section, or the charges of low-sensitivity photoelectric converting devices for two rows can be simultaneously transferred to the horizontal transfer section (column 4, lines 10-43; using the interlace method of Yamada, to read the high and low sensitivity rows pixels as described in Applicant's admitted prior art, either rows of high-sensitivity or low-sensitivity pixels can be transferred simultaneously).

Allowable Subject Matter

Claims 7-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chriss S. Yoder, III whose telephone number is (571) 272-7323. The examiner can normally be reached on M-F: 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lin Ye can be reached on (571) 272-7372. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CSY
January 18, 2008

LIN YE
SUPERVISORY PATENT EXAMINER